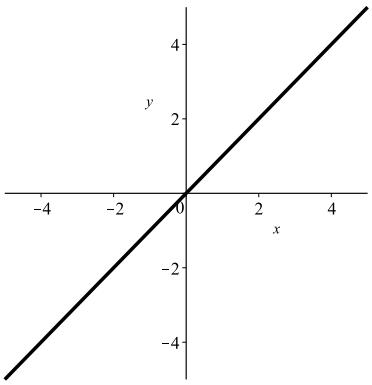
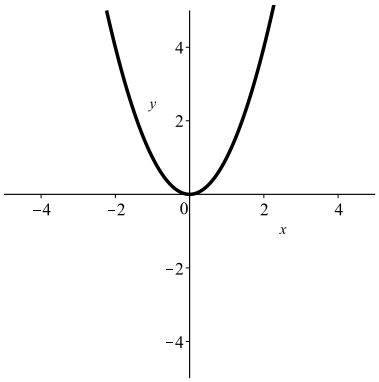
Graphs of Parent Functions

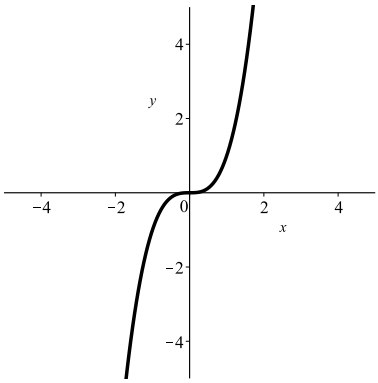
$y = x$



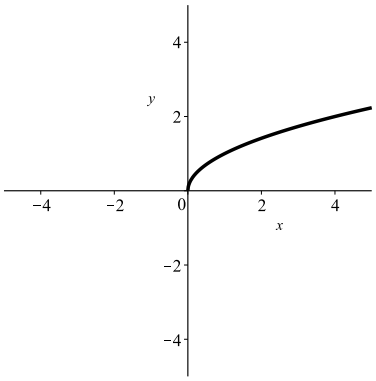
$y = x^2$



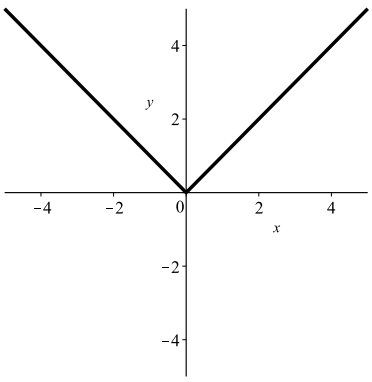
$y = x^3$



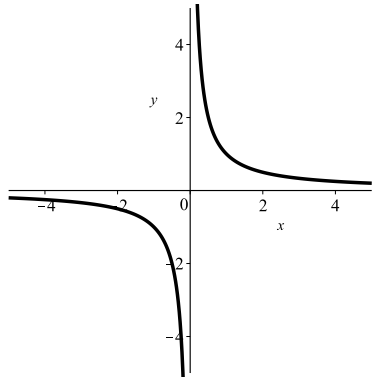
$y = \sqrt{x}$



$y = |x|$



$y = \dfrac{1}{x}$

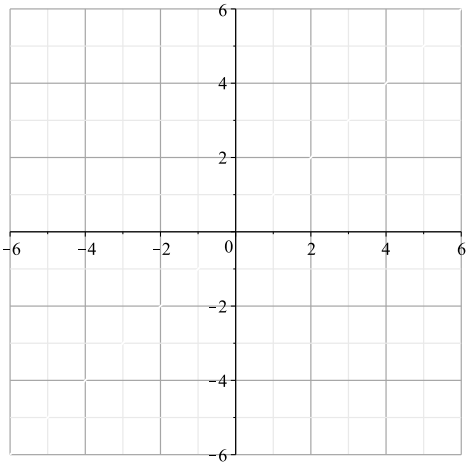


Transformations

SHIFTS For $c > 0$, the following translations shift the original graph $y = f(x)$ as indicated.

New Function	Shift	Example	Graph
$y = f(x) + c$		$y = x^2 + 2$	
$y = f(x) - c$		$y = x^2 - 3$	
$y = f(x - c)$		$y = (x - 4)^2$	
$y = f(x + c)$		$y = (x + 1)^2$	

Ex: Sketch $y = \sqrt{x + 2} + 3$

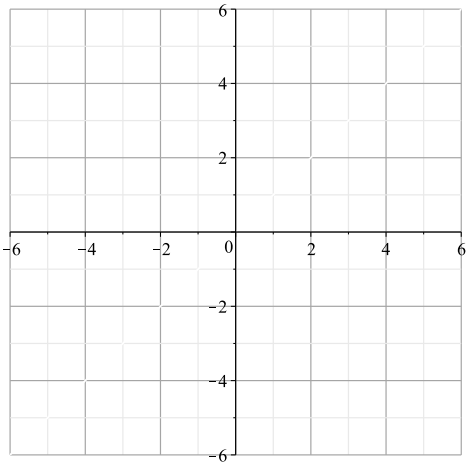


REFLECTIONS

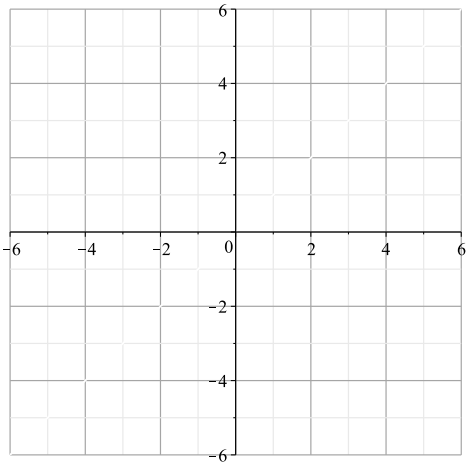
$y = f(-x)$ reflects the entire graph of $y = f(x)$ through the

$y = -f(x)$ reflects the entire graph of $y = f(x)$ through the

Ex: Sketch $y = -|x|$



Ex: Sketch $y = \sqrt{-x}$



Stretching or Compression For $c > 0$, the following transformations stretch or compress the original graph $y = f(x)$ as indicated.

$y = cf(x)$

For $c > 1$, _____ the graph of $y = f(x)$ _____ by a factor of c

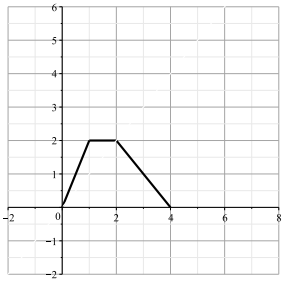
For $0 < c < 1$, _____ the graph of $y = f(x)$ _____ by a factor of c

$y = f(cx)$

For $c > 1$, _____ the graph of $y = f(x)$ _____ by a factor of $\frac{1}{c} < 1$

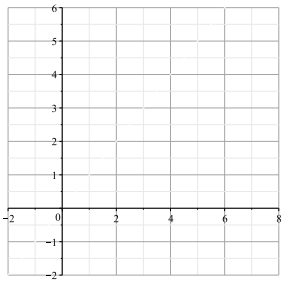
For $0 < c < 1$, _____ the graph of $y = f(x)$ _____ by a factor of $\frac{1}{c} > 1$

Ex: Given the following graph of $y = f(x)$,

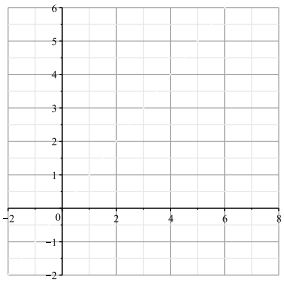


Sketch

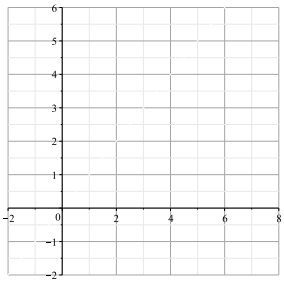
(a). $y = 2f(x)$



(b). $y = \frac{1}{2}f(x)$



(c). $y = f(4x)$



(d). $y = f\left(\frac{1}{2}x\right)$